

Reviewing the Data, From A to Z

Each of the nine sources of wage data collected and published by government agencies has its own strengths and limitations.

DEED's Labor Market Information Office is an A to Z source of employment data. In Alexandria, for example, there were 100 accommodation industry jobs on an annual average basis in 2015, according to the Quarterly Census of Employment and Wage (QCEW). That same data showed there were 217 wage and salary jobs across all industries in Zumbro Falls. Statewide, 500 actuaries and 680 zoologists and wildlife biologists were employed, according to the Occupational Employment Statistics (OES) program.

These same sources also report on wages and earnings in various forms. The average annual wage of an Alexandria accommodation industry worker was \$13,183 last year, while average annual wages received by a worker in Zumbro Falls was \$25,147. Minnesota auditors earned an average of \$101,621 in 2015, which easily tops the \$58,517 average annual paycheck paid to zoologists and wildlife biologists.

Three of the four federal/state cooperative programs that collect and report on Minnesota job numbers – QCEW, OES and Current Employment Statistics (CES) – also provide wage and earnings numbers. Wage numbers are valuable for people exploring careers, looking for ammunition when negotiating pay raises, or planning to move and comparing wages paid across localities.

Wage income data are also critical in gauging the speed and direction of Minnesota's economy, since wage income is the single most important source of income for most Minnesota households. Wage data are also the key to analyzing a wide range of labor market issues, including quality of job growth, minimum wages, wage and salary levels by education attainment, wage discrimination and income inequality.

Identifying a worker shortage for a specific occupation is another common use of wage data, as occupations in high demand

usually experience higher-than-average wage growth. Another common use of wage data is comparisons of wages across regions and over time to gain insights into the relative economic health of regions.

There are reams of wage data available on the internet (especially if sites such as Salary.com and Payscale.com are considered). Finding the data that you want can be daunting. This article reviews nine sources of government wage data that are available for free on the internet. None of the sources reviewed provides everything, as each has its own strengths and limitations.

Figures 1-3 highlight the major differences between the nine sources. Differences include how the data are collected, median versus average (mean) wage, where the data are collected from, frequency of data collection and publication, and the level of geographic, industrial and occupational detail published.

The following is a brief discussion of the nine sources of wage data.

Current Employment Statistics (CES)

CES reports average hourly and weekly earnings for the state and Minnesota's five metropolitan statistical areas each month (see Figure 1). Hourly wage estimates are available at the national level for over 600 private-sector industries, but the level of industry detail is limited for Minnesota since the monthly survey of employers is small.

Earnings estimates are only for all private employees for the four smaller MSAs and at the sector level for the Minneapolis-St. Paul MSA and the state. Hourly and weekly earnings estimates (along with average weekly hours) are timely economic indicators for gauging the direction of the economy but should be used with caution for the smaller metro areas.

CES earnings data are used by the Bureau of Economic Analysis in its initial estimates of state quarterly income.

Government and agricultural wages are excluded, and most of the Minnesota data start in 2007.

CES wage data show Minnesota's private-sector average hourly wage increased



11.3 percent between 2009 and 2015 before accounting for inflation. The U.S. private-sector average hourly wage increased slightly faster over the same period, rising 12.9 percent. Private hourly pay was still 4.1 percent higher in Minnesota (\$26.06) than nationwide (\$25.03) last year.

Quarterly Census of Employment and Wages (QCEW)

QCEW wages are compiled from quarterly unemployment insurance reports that almost all Minnesota employers are required to file (see Figure 1). Wages by place of work and industry for over 2.6 million jobs are in the QCEW records. The six-month time lag in

publication is the big drawback of QCEW wage data and other wage sources based on QCEW records. QCEW wage data are reported as average weekly wages derived by simply dividing total quarterly wages by 13, the number of weeks in a quarter.

QCEW offers wage data with a high degree of geographic and industrial detail. The detailed wage data are valuable for comparing industries or regions.

QCEW industry average wages are often noticeably different from CES average wage estimates, as QCEW earnings count all types of paid compensation, including bonuses and exercised stock options. CES counts only base pay.

FIGURE 1

	Current Employment Statistics (CES)	Quarterly Census of Employment and Wages (QCEW)	Occupational Employment Statistics (OES)
Description	Average hourly wage and weekly earnings for all private employees and private production workers	Quarterly and annual total wages and average weekly wages	Average and 25, 50, 75, and 90 percentiles hourly and annual wages
Industry or Occupation	Industries (mostly two digit NAICS)	Industries (all NAICS levels)	800 occupations (two-digit and six-digit SOC)
Methodology	Monthly survey of 2,400 employers	Census of all employers and jobs covered by unemployment insurance (97 percent of total wage and salary employment)	Semiannual survey of 2,700 employers per survey with three years' worth of data used to produce wage estimates
Populations Excluded	Self-employed, agricultural workers, domestic workers	Self-employed, railroad workers, student workers, elected officials, and most religious organization workers	Self-employed, some agricultural workers, domestic workers, military
Currency	Monthly data available by the third week of the following month	Quarterly data available six months after the end of the quarter	Annual estimates available with 10-month lag, wage estimates adjusted quarterly to account for wage inflation using the BLS Employment Cost Index
Historical Availability	2007 (selected industries back to 2001)	2000 (earlier years available at BLS website)	1997 (only current wage data is available at MN DEED's site, earlier data is available at BLS website)
Geographic Detail	U.S., states, MSAs	U.S., states, MSAs, sub-state regions, counties, cities	U.S., states, MSAs, sub-state regions
Advantages	Current wage data, time series analysis	Complete universe of employers, fine level of geographic and industry detail, wage data by firm size	Occupational employment, wage distribution, and staffing information
Limitations	Not available for small, local areas, revised and benchmarked annually	Six month time lag and some data confidentiality limits	Not a time series, limitations on reporting to small regions
Links	mn.gov/deed/ces	mn.gov/deed/qcew	mn.gov/deed/oes

QCEW wage data show that Minnesota's average annual wage in 2015 in the private sector was \$53,960, compared with \$52,870 for the U.S. Minnesota's private average annual wage was 2.1 percent higher than the national average last year, according to QCEW.

Occupational Employment Statistics (OES)

If you are interested in the wages of a specific occupation, OES is the source to turn to (see Figure 1). Mean and median wage rates (hourly and annual) along with 10th, 25th, 75th and 90th

percentiles are estimated for over 800 occupations.

The OES data tool is one of the most heavily used on the LMI website. People want to know how their paychecks compare with others or how the pay rate of an occupation varies within the state or across the nation.

OES data can also be used at the aggregated level (aggregated across all occupations) to examine a region's income inequality since the distribution of wages are provided.

OES wage estimates are obtained by surveying employers. Employers are asked about job titles, number of workers and wages. The job titles are then coded into detailed occupations. OES survey samples are drawn from non-farm employers who participate in Minnesota's unemployment insurance program. Roughly 6,000 employers provide wage numbers in the survey each year.

The survey, however, is not designed to produce wage estimates that are comparable from year to year. Since OES provides the only historical series

of detailed occupational wages, the limitation is often ignored. The highest median annual pay (median pay isn't available for all occupations) in Minnesota is earned by family and general practitioners (\$181,400). Half of family and general practitioners make more than that and half make less. That is about 10 times the lowest median annual wage of \$18,600 for fast food cooks.

Job Vacancy Survey (JVS)

Median hourly wage estimates for job openings in Minnesota are obtained through the Minnesota Job Vacancy Survey, which is conducted twice a year, in the second and fourth quarters. The survey, which has been carried out since 2001, provides median hourly wage estimates for two-, three- and six-digit levels for occupations

and the two-digit industry level (see Figure 2). For example, during the second quarter of 2015, the median hourly wage offer for civil engineers was \$28.42, while the median hourly wage offer for openings in the manufacturing industry was \$15.58.

Wage estimates are gathered through a sample of approximately 10,000 firms across Minnesota's 13 economic development regions. Analysis of job vacancy wage offers over time provides insight into the quality of jobs (in terms of wages) being created in Minnesota. More recent job vacancy releases have included wage estimates by size of company and 25th and 75th percentiles for wage offers, in addition to median wage offers (50th percentile).



FIGURE 2

	Job Vacancy Survey (JVS)	Quarterly Employment Demographics	Graduate Employment Outcomes (GEO)
Description	Median hourly wage offer	Quarterly and annual median and average hourly wages by gender and age	Median hourly and median annual wages of recent graduates from various post-secondary programs in Minnesota
Industry or Occupation	Industries (2-digit NAICS) and occupations (2-digit and 6-digit SOC)	Industries (two and three digit NAICS levels), gender, and age groups	Classification of Instructional Programs (CIP), school and industry
Methodology	Semiannual survey of 5,000 employers per survey	Unemployment insurance records linked to driver's license data. Roughly 90 percent of individuals in unemployment insurance records have driver's license match.	Annual and quarterly post-secondary graduates wage records are linked to unemployment insurance wage records.
Populations Excluded	Self-employed, railroad workers, student workers, elected officials, and workers of religious organizations	Self-employed, railroad workers, student workers, elected officials, and most religious organization workers	Self-employed, federal government employees, and graduates employed outside of Minnesota
Currency	2nd and 4th quarter data available four months after end of quarter	Quarterly data available six months after the end of the quarter	Most recent data is for graduates during the July 2013 - June 2014, lagged time is roughly six months for wage data
Historical Availability	2001	2000	July 2006 - June 2009 graduates
Geographic Detail	Minnesota, Seven-Country Twin Cities Metro Area, Greater Minnesota, Economic Development Regions, and Planning Regions	Minnesota, sub-state regions, and counties	Minnesota, Twins Cities Area, and Greater Minnesota
Advantages	Part-time versus full-time and education requirement wage data for job vacancies	Median wage data by gender and age across detailed industries and detailed areas	Data provides realistic expectations for employment and wages following graduation in a specific program
Limitations	Not available for detailed local areas	Six month time lag and some data confidentiality limits	Data limited to programs which have a least 10 graduates, wages of self-employed graduates and graduates who obtain jobs outside of state are excluded
Links	mn.gov/deed/jvs	Not yet available - check https://mn.gov/deed/data/ after December 2016	mn.gov/deed/geo

Quarterly Employment Demographics (QED)

QED is the newest wage data source, with plans for the dataset to go live on DEED's website in September. QED combines the wage information from Minnesota's unemployment insurance records (the same wage source underlying QCEW) with age and gender data from driver's license records (see Figure 2).

Median and average hourly wage by industry, gender and age is available from QED. Wage data are provided for the state, metro areas, economic development regions, planning regions and counties. Industry detail is three digits and up. The time lag for this dataset is the same as QCEW data (six months) and the data are available back to 2000.

QED can be used to tackle a wide range of labor market issues, including the aging of Minnesota's labor force (see article by Cameron Macht in this issue of Trends). The inclusion of median wage is also an improvement over average wages as reported by QCEW. Median wages in most cases provide a clearer picture of wages across industries, gender or age groups, as average wages can often lead to inaccurate conclusions if wages are highly skewed. QED data show that women have lower median hourly wages than

men in all 20 major industrial sectors.

Graduate Employment Outcomes (GEO)

If you are interested in wages paid to recent graduates of postsecondary programs, GEO is designed with you in mind. The GEO data link recent graduates of various Minnesota postsecondary programs to their employment histories contained in unemployment insurance files. The oldest data are for employment history, including median hourly wage, for roughly 189,000 people who graduated from a Minnesota postsecondary program between 2006 and 2009 (see Figure 2).

The median wage for these individuals was \$18.30 one year after graduation, \$19.72 after two years and \$23.23 five years after graduation. Each year graduates from the past year are added to the database, with annual updates on their employment outcomes added.

The most recent graduate cohort is individuals who graduated between July 2013 and June 2014. For each cohort, wage data can be explored by award type (four types from certificates to graduate degrees), institution type (five types from private career schools to public, four-year colleges), individual schools (approximately 140 schools)

and type of instruction program (more than 30 programs from agriculture to visual and performing arts).

American Community Survey (ACS)

For many wage-related requests, the source to consult is ACS data. ACS is the only household-based wage dataset with over 72,000 Minnesota households responding annually as part of the U.S. Census Bureau's ongoing effort to gather detailed demographic, social, economic and housing statistics for all areas in the country (see Figure 3).

Since ACS is a household survey, estimates are by place of residency, unlike the other wage data sources, which are all by place of work. If one wants earnings data for residents of Bloomington, then ACS data are your best bet. But if one wants earnings information of workers working in Bloomington, then QCEW data would be the best choice.

Median wage is available for very smaller geographic areas but only as five-year averages. One-year estimates of median wages are available for larger areas. Wage information is available across a wide range of demographic characteristics, such as age, gender, education attainment and ethnicity. Wage or income

FIGURE 3

	American Community Survey (ACS)	Bureau of Economic Analysis (BEA)	Quarterly Workforce Indicators (QWI)
Description	Median and selected average annual earnings	Quarterly and annual total wages and average wages	Average monthly earnings and total quarterly earnings
Industry or Occupation	Industries and occupations	Industries (two and three SIC and NAICS levels)	Industry (two, three, and four digit NAICS levels), gender, ethnicity, race, education attainment, and age groups
Methodology	Annual survey by U.S. Census covering 2.3 million households across U.S. including roughly 72,000 in Minnesota	Most of the wage estimates are based on QCEW wage data with adjustments made for unreported wages and salaries for certain industries	Unemployment insurance records combined with U.S. Census records
Populations Excluded	None	Self-employed, railroad workers, student workers, elected officials, and most religious organization workers	Self-employed, railroad workers, student workers, elected officials, most religious organizations workers
Currency	Updated annually	Quarterly data available one quarter after end of the quarter with annual wages available with two quarter lag	Quarterly data available six months after the end of the quarter
Historical Availability	Various years depending on geographic detail, most Minnesota statewide data starts in 2005	1958 - 2001 SIC and 1990 - 2012 NAIC	Third quarter 1994
Geographic Detail	U.S., states, MSAs, counties, cities, census tracts	U.S., states, MSAs, sub-state regions, counties, cities	State, counties, micro/metropolitan areas, workforce service areas
Advantages	Fine geographic detail with wage data available for many demographic characteristics such as education attainment, ethnicity, disability status, class of worker status, and age	Wage data back to 1969 although the industry classification system changes in 2001, average proprietors' income by industry which is an estimate of annual average wage for self-employed	Wage data by worker characteristics (gender, age, race, ethnicity, and education) and by firm characteristics (firm age and firm size)
Limitations	Nine to twelve month time lag and small area data available only as five-year averages	One quarter lag on quarterly total wages, six month lag on state average annual wages, and one year lag on county average annual wage, calculations required for industry level annual average wages	Three quarter time lag
Links	http://factfinder2.census.gov/	http://www.bea.gov/regional/index.htm	http://lehd.ces.census.gov/applications/qwi_online/

estimates for self-employed workers are provided by the ACS since households are asked about their class of work status (employed in a wage and salary job or self-employed).

Self-employed earnings can be a significant share of total income, depending on an area's mix of industries. They are only available from ACS or BEA data.

Minnesotans reported through the ACS that the 2014 median annual wage was \$35,700 for private for-profit company workers, \$47,300 for self-employed in own incorporated business workers, and \$26,000 for self-employed in own not incorporated business workers.

Bureau of Economic Analysis (BEA)

BEA wage data have two main advantages. First, the data go back to 1958 for Minnesota's roughly 90 industries (one-, two- and three-digit SIC industries). The older data, through 2000, are based on the SIC industry classification, while data after 2000 are based on the NAICS industry classification. Average annual wage by industry is available from 1969 forward, with only total industry wage available for earlier years. BEA's data tool is well-designed, making data downloading easy, which is its other main advantage (see Figure 3).

BEA wage data are based mainly on QCEW wage data, but certain industries have their wage totals revised upwards by the BEA to account for under-reported earnings. BEA earnings data are the only other source of self-employed earnings data besides ACS. Self-employed earnings by industry are reported as proprietor's income obtained through tax returns.

BEA wage data are invaluable for researchers looking for wage changes across industries and regions from a long-term perspective. For example, state and local government workers in Minnesota accounted for 11.2 percent of all wages and salaries paid to Minnesota wage and salary workers in 1958. That percent jumped to 15.6 percent by 1972 and then tailed off to 11.3 percent in 2015. Blame the baby boomers school years for the 1972 peak percentage.

Quarterly Workforce Indicators (QWI)

An innovative wage source is the Quarterly Workforce Indicators compiled by the U.S. Census Bureau. QWI is useful for analysts interested in addressing labor market trends across time and regions and certain demographic variables (see Figure 3).

Workers' wage data, compiled from unemployment insurance

files, are matched with demographic characteristics of workers and the firms employing them that the Census Bureau already has on record. The average monthly earnings by age, gender, education attainment, race and ethnicity of workers across industries is aggregated into several industrial levels. The data are available by two-, three- and four-digit industries. Average monthly earnings by firm age and firm size (in terms of number of employees) across industries are also available.

QWI data can be used to see the age distribution of workers across industries, helping to identify which industries are top heavy with older workers and likely to be ramping up hiring as their workers retire. QWI wage data by education attainment show that Minnesota workers with bachelor's degrees or higher earned on average \$6,170 monthly during the third quarter of 2015, compared with the \$3,545 average monthly earnings of workers with only a high school degree. That works out to an 86 percent wage premium for college educated workers.

Many, although not all, wage-related issues or questions can be answered by examining the various wage data reviewed here. Understanding how the wage sources vary is essential to arriving at the right answers. **T**

Putting Wage Data to Work

Currently Employment Statistics (CES)

“Job Hours and Pay,” **Minnesota Employment Review**, November 2013
www.mn.gov/deed/newscenter/publications/review/november-2013/jobs-hours-pay.jsp

Occupational Employment (OES)

“Real Wage Growth by Occupation,” **Minnesota Employment Review**, August 2015
www.mn.gov/deed/newscenter/publications/review/august-2015/real-wage-growth.jsp
“Regional Wage Comparisons,” **Minnesota Employment Review**, November 2015
www.mn.gov/deed/newscenter/publications/review/november-2015/regional-wage-comparisons.jsp

Quarterly Census of Employment and Wages (QCEW)

“The Changing Face of Minnesota Manufacturing,” **Minnesota Economic Trends**, December 2014
www.mn.gov/deed/newscenter/publications/trends/december-2014/manufacturing.jsp

Job Vacancy Survey (JVS)

“What’s Happening to Middle-Wage Jobs?” **Minnesota Employment Review**, August 2012
<http://cdm16105.contentdm.oclc.org/cdm/compoundobject/collection/p15453coll4/id/5016/rec/24>

Graduate Employment Outcomes (GEO)

“Helping Students Make Educational Choices,” **Minnesota Economic Trends**, September 2014
www.mn.gov/deed/newscenter/publications/trends/september-2014/educational-choices.jsp
“Where Are the Jobs for Recent College Graduates?” **Minnesota Employment Review**, July 2015
www.mn.gov/deed/newscenter/publications/review/july-2015/where-are-the-jobs.jsp

Quarterly Workforce Indicators (QWI)

“Stuck in Neutral,” “Wage and Employment Disparities for Minority Workers” and “Diversity in Greater Minnesota,” **Minnesota Economic Trends**, December 2015
www.mn.gov/deed/newscenter/publications/trends/december-2015/

American Community Survey (ACS)

“Change in Income by Education Level, by Race in Minnesota,” Minnesota Private College Research Foundation, July 2010
www.mnprivatecolleges.org/sites/default/files/downloads/Research_Brief_educ_income_race.pdf

Bureau of Economic Analysis (BEA)

“Show Me the Money,” **Minnesota Economic Trends**, September 2015
www.mn.gov/deed/assets/sept-2015-trends-money_tcm1045-209655.pdf

